

**TWIN DISC
INCORPORATED**



**System
Operation
and
Maintenance
Manual**

**Marine
Control System**

**Model:
EC300**

Document Number: 1024221

NOTICE

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EC300 Marine Control System Operation and Maintenance Manual

Notes



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EXCLUSIVE LIMITED WARRANTY-
COMMERCIAL MARINE TRANSMISSION,
SURFACE DRIVE, and ELECTRONIC CONTROL SYSTEMS

A. Twin Disc, Incorporated warrants all assembled products and parts, (except component products or parts on which written warranties issued by the respective manufacturers thereof are furnished to the original customer, as to which Twin Disc, Incorporated makes no warranty and assumes no liability) against defective materials or workmanship *for a period of twenty-four (24) months from the date of shipment by Twin Disc, Incorporated to original customer, but not to exceed twelve (12) months of service, whichever occurs first.* **This is the only warranty made by Twin Disc, Incorporated and is in lieu of any and all other warranties, express or implied, including the warranties of merchantability or fitness for a particular purpose and no other warranties are implied or intended to be given by Twin Disc, Incorporated.**

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B. The exclusive remedy provided by Twin Disc, Incorporated whether arising out of warranty within the applicable warranty period as specified, or otherwise (including tort liability), shall at the sole option of Twin Disc, Incorporated be either the repair or replacement of any Twin Disc, Incorporated part or product found by Twin Disc, Incorporated to be defective and the labor to perform that work and to remove and reinstall (or equivalent credit). In this context, labor is defined as the flat rate labor hours established by Twin Disc, Incorporated in the published Twin Disc Flat Rate Schedule, required to remove, disassemble, inspect, repair, reassemble, reinstall and test the Twin Disc, Incorporated product only. Authorized reasonable travel and living expenses will be considered for payment on all Commercial Marine Products except on Electronic Control Systems. . Under no circumstances, including a failure of the exclusive remedy, shall Twin Disc, Incorporated be liable for economic loss, consequential, incidental or punitive damages.

The above warranty and remedy are subject to the following terms and conditions:

1. Complete parts or products upon request must be returned transportation prepaid and also the claims submitted to Twin Disc, Incorporated within sixty (60) days after completion of the in warranty repair.
2. The warranty is void if, in the opinion of Twin Disc, Incorporated, the failure of the part or product resulted from abuse, neglect, improper maintenance or accident.
3. The warranty is void if any modifications are made to any product or part without the prior written consent of Twin Disc, Incorporated.
4. The warranty is void unless the product or part is properly transported, stored and cared for from the date of shipment to the date placed in service.
5. The warranty is void unless the product or part is properly installed and maintained within the rated capacity of the product or part with installations properly engineered and in accordance with the practices, methods and instructions approved or provided by Twin Disc, Incorporated.
6. The warranty is void unless all required replacement parts or products are of Twin Disc origin or equal, and otherwise identical with components of the original equipment. Replacement parts or products not of Twin Disc origin are not warranted by Twin Disc, Incorporated.

C. As consideration for this warranty, the original customer and subsequent purchaser agree to indemnify and hold Twin Disc, Incorporated harmless from and against all and any loss, liability, damages or expenses for injury to persons or property, including without limitation, the original customer's and subsequent purchaser's employees and property, due to their acts or omissions or the acts or omissions of their agents, and employees in the installation, transportation, maintenance, use and operation of said equipment.

D. Only a Twin Disc, Incorporated authorized factory representative shall have authority to assume any cost or expense in the service, repair or replacement of any part or product within the warranty period, except when such cost or expense is authorized in advance in writing by Twin Disc, Incorporated.

E. Twin Disc, Incorporated reserves the right to improve the product through changes in design or materials without being obligated to incorporate such changes in products of prior manufacture. The original customer and subsequent purchasers will not use any such changes as evidence of insufficiency or inadequacy of prior designs or materials.

F. If failure occurs within the warranty period, and constitutes a breach of warranty, repair or replacement parts will be furnished on a no charge basis and these parts will be covered by the remainder of the unexpired warranty which remains in effect on the complete unit.



FLAT RATE SCHEDULE FOR COMMERCIAL MARINE TRANSMISSION

(Hourly Labor Rate Must be Acceptable to Twin Disc, Incorporated.)

Product Code / Model Series	R&R	Unit Rebuild	Clutch Repair (both packs)	R&R Pump	R&R Valve	Rebuild Valve
0432 - MG5010 & MG5011 SERIES	10.0	8.0	2.0	1.0	1.0	0.5
0401 - MG506 SERIES	10.0	11.0	4.0	1.0	1.0	0.5
0435 - MG5050 SERIES	10.0	11.0	4.0	1.0	1.0	0.5
0437 - MG5061 & MG5062V SERIES	10.0	11.0	4.0	1.0	1.0	0.5
0453 - MG5055A SERIES	10.0	11.0	4.0	1.0	1.0	0.5
1706 - MG5065A SERIES	10.0	11.0	4.0	1.0	1.0	0.5
1707 - MG5065SC SERIES	10.0	11.0	4.0	1.0	1.0	0.5
0425 - MG5085 SERIES	10.0	12.0	4.0	1.0	1.0	0.5
0442 - MG5075A SERIES	10.0	12.0	4.0	1.0	1.0	0.5
0443 - MG5075SC SERIES	10.0	12.0	4.0	1.0	1.0	0.5
0476 - MG5082 SERIES	10.0	12.0	4.0	1.0	1.0	0.5
0419 - MG5114 SERIES	10.0	17.0	5.0	1.0	1.0	0.5
0433 - MG5090 SERIES	10.0	17.0	5.0	1.0	1.0	0.5
0489 - MGX5114A SERIES	10.0	17.0	5.0	1.0	1.0	0.5
0490 - MGX5114SC SERIES	10.0	17.0	5.0	1.0	1.0	0.5
0491 - MGX5114IV SERIES	10.0	17.0	5.0	1.0	1.0	0.5
1719 - MGX5095A SERIES	10.0	17.0	5.0	1.0	1.0	0.5
1728 - MG5095A SERIES	10.0	17.0	5.0	1.0	1.0	0.5
1729 - MG5095SC SERIES	10.0	17.0	5.0	1.0	1.0	0.5
0405 - MG514 SERIES	10.0	25.0	6.0	1.0	1.0	0.5
0447 - MG5145A SERIES	10.0	25.0	6.0	1.0	1.0	0.5
0448 - MG5145SC SERIES	10.0	25.0	6.0	1.0	1.0	0.5
0492 - MGX5135A SERIES	10.0	25.0	6.0	1.0	1.0	0.5
0494 - MGX5145SC SERIES	10.0	25.0	6.0	1.0	1.0	0.5
0426 - MG516 & MG5170 SERIES	10.0	28.0	8.0	1.0	1.0	0.5
0477 - MG5170 SERIES	10.0	28.0	8.0	1.0	1.0	0.5
0412 - MG5200 SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0416 - MG518 SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0459 - MG6557SC SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0461 - MG6557RV SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0473 - MG-520-1HP SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0479 - MG-5222DC SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0480 - MG-5225DC SERIES	10.0	32.0	10.0	1.0	1.0	0.5
1743 - MGX-5225DC SERIES	10.0	32.0	10.0	1.0	1.0	0.5
0441 - MG-6650-00-SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0446 - MG-6848-00-SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0478 - MG-6690SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0484 - MGX-61500SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0485 - MGX-6650 SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0487 - MGX-6690SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0488 - MGX-6848SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
1711 - MG-5321 SERIES	12.0	32.0	16.0	1.0	1.0	0.5
1721 - MGX-6620SC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
1732 - MGX-5321DC SERIES	12.0	32.0	16.0	1.0	1.0	0.5
1737 - MGX-6599A SERIES	12.0	32.0	16.0	1.0	1.0	0.5
0408 - MG540 SERIES	20.0	62.0	20.0	1.0	1.0	0.5
0418 - MG5600 SERIES	20.0	62.0	20.0	1.0	1.0	0.5
1741 - MGX-5600 SERIES	20.0	62.0	20.0	1.0	1.0	0.5



FLAT RATE HOUR ALLOWANCE **COMMERCIAL MARINE SURFACE DRIVE** (Hourly Labor Rate Must be Acceptable to Twin Disc, Incorporated.)

Description of Flat Rate Labor	ASD6	ASD8	ASD 10	ASD 11	ASD1 2	ASD 14	ASD 15	ASD 16
Removal and Reinstallation	2	3	3	3	4	6	8	8
Recondition complete unit and test for leaks	5	6	6	6	6	6	8	8
Replace front oil seal	1	1	1	1	1	1	1	1
Replace input shaft	1	3	3	3	3	4	4	4
Replace input gear/sprocket	1	3	3	3	-	-	-	-
Replace Chain	1	4	4	4	-	-	-	-
Replace H-Joint	2	2	2	2	3	3	3	3
Replace thrust ball	2	2	2	2	3	3	3	3
Replace retainer ring	2	2	2	2	2	2	2	2
Replace propeller shaft	2	3	3	3	3	4	4	4
Replace thrust tube	2	3	3	3	4	5	6	6
Replace rear oil seal	1	1	1	1	1	1	1	1
Replace steer cylinder	1	1	1	1	1	1	1	1
Replace power steer pump	1	1	1	1	1	1	1	1
Replace trim pump	1	1	1	1	1	1	1	1
Replace Ball Boot	2	2	2	2	2	2	2	2
Replace and align driveline	1	2	2	2	2	3	3	3

FLAT RATE HOUR ALLOWANCE **COMMERCIAL MARINE ELECTRONIC CONTROL SYSTEMS** (Hourly Labor Rate Must be Acceptable to Twin Disc, Incorporated.)

* Travel and related expenses are not included as a part of Twin Disc Electronic Control Warranty.

Description of Flat Rate Labor (hours allowed for function to the right =>)	EC075	EC200	EC250	EC300	External Sensor
Removal and Reinstallation and Test	3	3	3	3	1
Electronic Control Repair *	0	0	0	0	0
* there are no serviceable internal components					

Notes

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Notes

Introduction

The Twin Disc Incorporated Marine Control System allows the operator to command one or more stern engines using analog or digital control heads via the EC300 Control as shown below. See [“System Operation” on page 3](#).

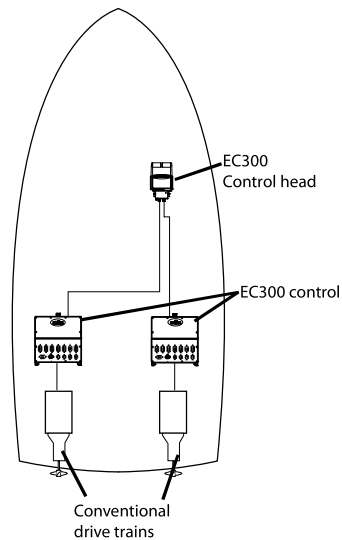


Figure 1. Marine Control System Configuration

NOTES

System Operation

The EC300 Control System consists of an EC300 Control, a Control Head, an optional Servo Actuator, an optional Display, and several wire harnesses. One EC300 Control System is required for each engine.

The Control System coordinates both engine and marine transmission functions. One or two levers (analog or digital), a Station Select button, and a Mode Select switch on the Control Head enable the operator to control the operation of the system and the installed options as shown in [Figure 2](#) and [Figure 3](#). [Figure 4](#) and [Figure 5](#) show the lever range of operation.

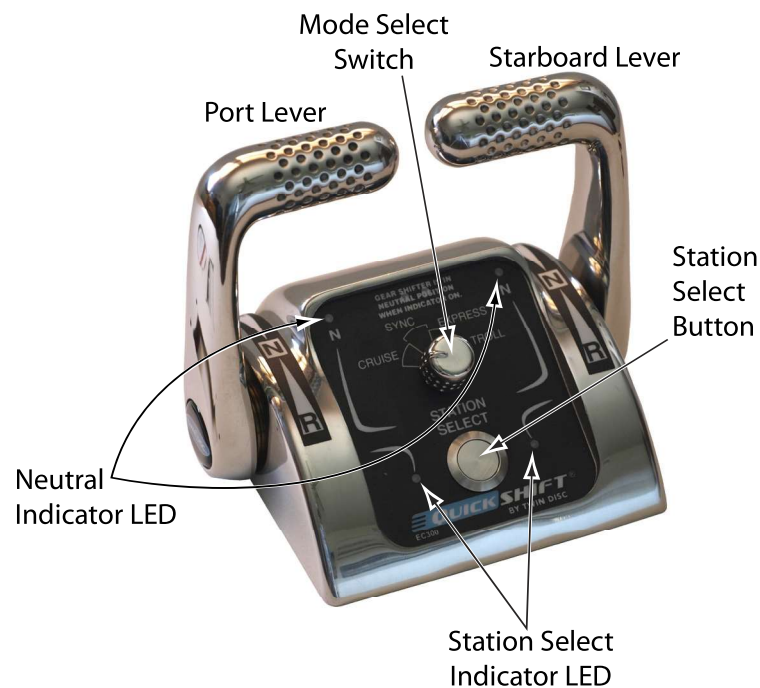


Figure 2. Operator Controls on the Analog Control Head

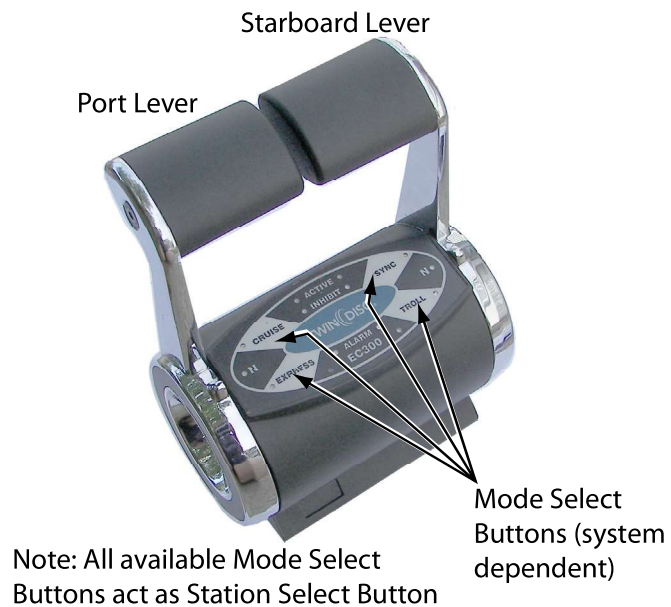


Figure 3. Operator Controls on the Digital Control Head

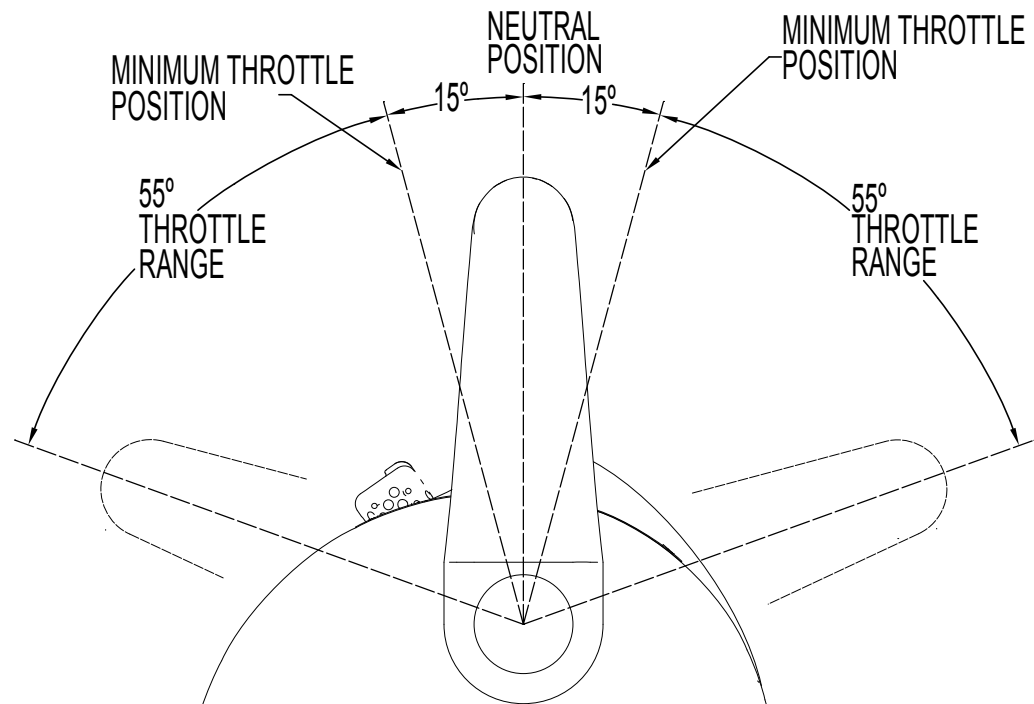


Figure 4. Analog Control Head Lever Range of Operation

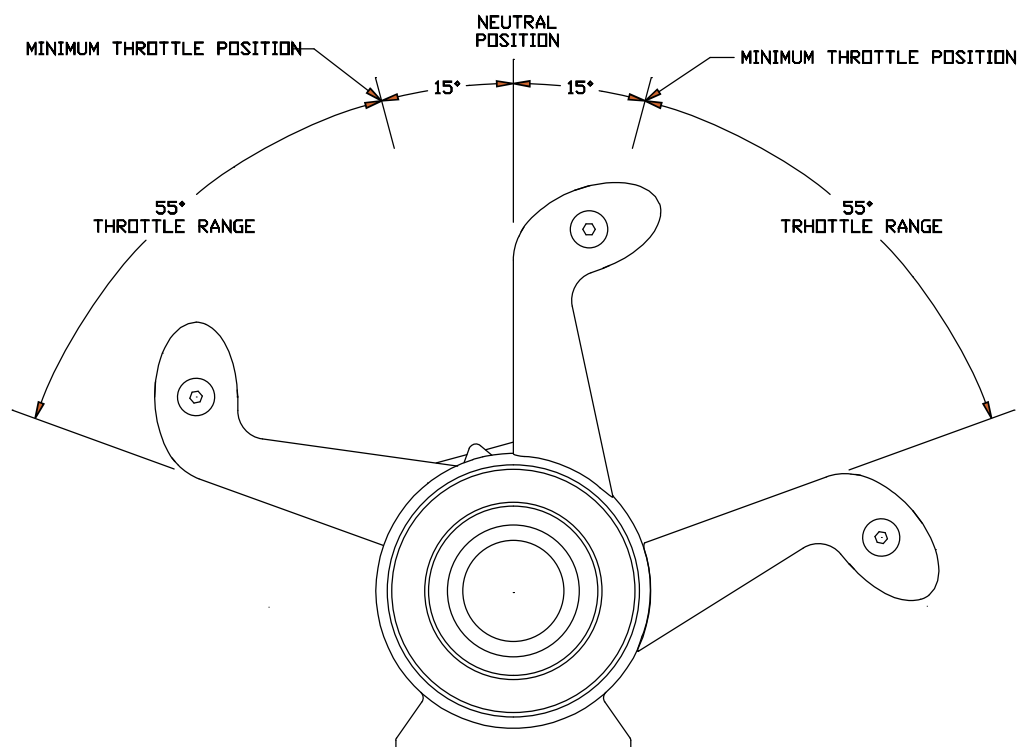


Figure 5. Digital Control Head Lever Range of Operation

Each lever, of both single lever and dual lever Control Heads, controls gear selection and throttle for one engine/gear set. The Station Select button on the Control Head takes command at a specific location. When the boat is equipped with Single Lever Sync configured controls, the outboard levers (port most or starboard most) control two or more engine/transmission sets. The red Station Select LED next to the Station Select button (near the top of the digital Control Head label) verifies that the Control Head is active when continuously illuminated. When the Station Select LED is flashing or off, the Control Head is not active.

Note: On digital Control Heads, any of the four button switches that are configured in the Control serve as the Station Select Switch.

The Mode Select switch on the Control Head selects up to three engine cruise speeds, up to three trolling speeds, and/or optional Engine Synchronization, or Express Modes. The LEDs indicate as follows:

- ☐ The green Mode LED on the digital Control Head indicates the operating mode.
- ☐ The yellow neutral LED(s) provide for transmission status indication as follows:

- Constantly lit when the Transmission is in Neutral.
 - Flashes when the Controller is in the Direction Disable mode during engine warm-up. See [“Engine Warm-up while using Direction Disable Mode” on page 25.](#)
- The yellow Inhibit LED(s) on the digital Control Head indicate that a requested action is being inhibited by an operating parameter that is out of the configured range for that action.
- Red Alarm LED:
- Digital Control Head: Blinks an error (flash) code when an error has been detected.
 - Analog Control Head: Blinks when the Control no longer engages the transmission (Controller Neutral).

Digital Lever Calibration

Enter Digital Lever Calibration by performing the following procedure.

1. Power down the EC300 Control.
2. Simultaneously press buttons 3 and 4 as shown in [Figure 6](#).

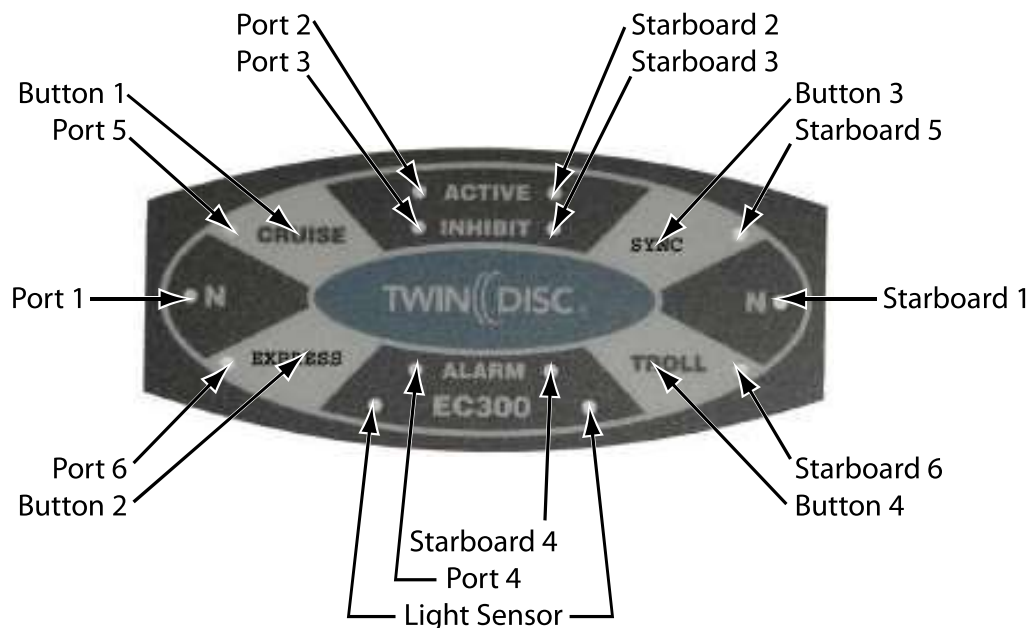


Figure 6. Digital Control Head LED and Switch Identification

3. Power up the EC300 Control and continue pressing buttons 3 and 4 until all LEDs and the beeper turn off for two seconds and the PORT LED 1 and the STBD LED 1 alternately flash once per second. This indicates that Digital Calibration mode has been entered.
4. Move both levers to the full forward direction (toward the bow of the vessel) and press any button. The Control Head acknowledges this position by turning on all LEDs and the beeper for 500 ms.
5. Move both levers to the forward detent position and press any button. The Control Head acknowledges this position by turning on all LEDs and the beeper for 500 ms.
6. Move both levers to neutral and press any button. The Control Head acknowledges this position by turning on all LEDs and the beeper for 500 ms.

7. Move both levers to the reverse detent position and press any button. The Control Head acknowledges this position by turning on all LEDs and the beeper for 500 ms.
8. Move both levers to the full reverse direction (towards the stern of the vessel) and press any button. The Control Head acknowledges this position by turning on all LEDs and the beeper for 500 ms.

Calibration is now complete. The Control Head transfers all of the calibration positions from temporary memory to non-volatile memory, and acknowledges success by turning on all LEDs and the beeper for 1.5 seconds. Return the levers to the neutral position.

Analog Lever Calibration

Both the port and starboard levers can be calibrated at the same time.

Note: When the optional display is installed the calibration instructions are displayed on its screen. When Calibration mode is entered, the Display presents the proper lever movements, followed by STATION SAVED when the task is accepted by the Controller.

1. Turn off the engines if not already off.
2. Press and hold the Station Select button for at least 20 seconds to enter Analog Lever Calibration mode. When Calibration mode is entered, all of the LEDs flash and then go out.
3. Place the lever(s) into the full forward position.
4. Press the Station Select button for approximately 6 seconds. The neutral LED(s) flash very fast, indicating acceptance of the setting. The LED(s) stop flashing when the Station Select button is released.
5. Move the lever(s) to the forward Detent position.
6. Press the Station Select button for approximately 6 seconds. The neutral LED(s) flash very fast, indicating acceptance of the setting. The LED(s) stop flashing when the Station Select button is released.
7. Move the lever(s) to the Reverse Detent position.
8. Press the Station Select button for approximately 6 seconds. The neutral LED(s) flash very fast, indicating acceptance of the setting. The LED(s) stop flashing when the Station Select button is released.

9. Move the lever(s) to the Full Reverse position.
10. Press the Station Select button for approximately 6 seconds. The neutral LED(s) flash continuously, indicating acceptance of the settings and completion of calibration.
11. Move the lever(s) to neutral. The LED(s) stop flashing.

Taking Command at a Station

When the neutral interlock switch is properly connected, the operator must take command with a Control Head, and the levers must be at neutral, before the engine(s) can be started.

On some vessels, a neutral interlock switch is not part of the starting system and the engine(s) can be started without first selecting a control station. In these applications, when the engine(s) have just been started, and the Controls powered, the Transmission System is in the neutral operating condition. The Control Head levers should be placed in the neutral position prior to taking command.

Note: It is good practice to always select the operating mode, to be used after taking command, prior to pressing the Station Select button. With digital Control Heads, pressing the desired operating mode button also selects the Control Station.

Press the Station Select button (analog Control Heads) or operating mode button (digital Control Head) to take command at that Station.

Lever Function in Cruise Mode

Note: With digital Control Heads, pressing the Cruise button to select the station also selects the engine speed that has been configured for Cruise 1, and subsequent Cruise button presses select Cruise 2 and Cruise 3 engine speed settings.

Selecting Forward (Ahead)

Move the lever toward the bow of the boat to the forward detent position in order to select the forward vessel direction. At this position, the transmission shifts into the forward gear. The remaining lever travel after the forward detent position controls the engine throttle.

Selecting Reverse (Astern)

Move the lever toward the stern of the boat to the reverse detent position in order to select the reverse vessel direction. At this position, the transmission shifts into the reverse or reverse gear. The remaining lever travel after the reverse detent position controls the engine throttle.

Direction Reversal

Reversals of direction can be made at any time. An automatic timed sequence forces the throttle to idle while the vessel slows before engaging the clutch for the opposite direction. This is followed by the return of the engine throttle to the position called for by the lever.

Lever Function in Express Mode

This mode allows the operator to achieve very low vessel speed by means of a controlled slipping clutch when the lever is placed in the forward detent or reverse detent position. Slight vessel speed variation at the detent position is normal in Express Mode. In Express Mode, the propeller speed increases as the lever is advanced, until the lever reaches a point where the clutch is fully engaged and then engine speed increases as lever position increases.

Setting the Vessel Speed at Detent

The vessel speed at the forward detent position is configured by the operator placing both the Port and Starboard lever in the forward detent position, while in Express Mode, and then holding the Station Select button pressed for more than two seconds. This puts the Control in the Set Detent Speed mode, and the button can be released.

Advance the levers until the desired steady vessel speed is achieved, and press the Station Select button twice within three seconds. Return the levers to the neutral detent position. The propeller speed at the forward detent position is now updated for both the port and starboard controls and setting the speed at detent is now complete.

Note: If the optional display is present, it prompts the user during this process.

Lever Function in Troll Mode

This mode allows the operation of the vessel at low speed by means of a controlled slipping clutch with the engine speed fixed, and the lever controlling only the propeller speed.

Setting the Vessel Speed at Detent

The vessel speed at the forward detent position is configured by the operator placing the port and starboard levers in the forward detent position, while in troll mode, and then pressing the Station Select button for at least two seconds. This puts the Control in the Set Detent Speed mode, and the button can be released.

The yellow neutral LED flashes at a rate proportional to propeller speed. The operator then slowly advances the port lever until the desired vessel speed is achieved. At this time, the operator presses the Station Select button twice within three seconds. Return the levers to the neutral detent position. The propeller speed at the forward detent position is now updated for both the port and starboard controls and setting the speed at detent is now complete.

Note: When the optional display is present, it prompts the user during this process.

Lever Function in Single Lever Sync

The Single Lever Sync feature allows multiple engine vessels to be operated from the designated Master Lever at the active Control Station, in the forward direction only. The designated master lever is determined at the time of configuration or may be selected by a Master Lever switch if so configured and equipped.

This feature is only active when the Operating mode is Express Sync or Cruise Sync.

When the Single Lever Sync is active, all Controls in the system receive their lever position commands from the designated master lever. All transmissions on the vessel are in the forward gear, all Controls are operating in the same mode, and all engines are operating at the same throttle setting. When the Single Lever Sync feature cannot be engaged, all controls continue to use their own lever and commands.

The Single Lever Sync feature is cancelled when any lever at the active Control Station is moved out of the forward direction.

CAUTION

When the Single Lever Sync feature is cancelled, for any reason, each Control reverts to receiving throttle commands from its own lever. When the position of the designated lever is significantly different from the position of the control's own lever, a change is made in vessel speed.

Mode Select Switch (Analog Control Heads)

The operations that can be controlled by the Mode Select switch depend on the type of Control Heads that are installed on the boat. Control Heads are available with a variety of function combinations. The following figures show the labels from several different Control Head configurations, some of which may be available in both single lever and dual lever Control Heads.

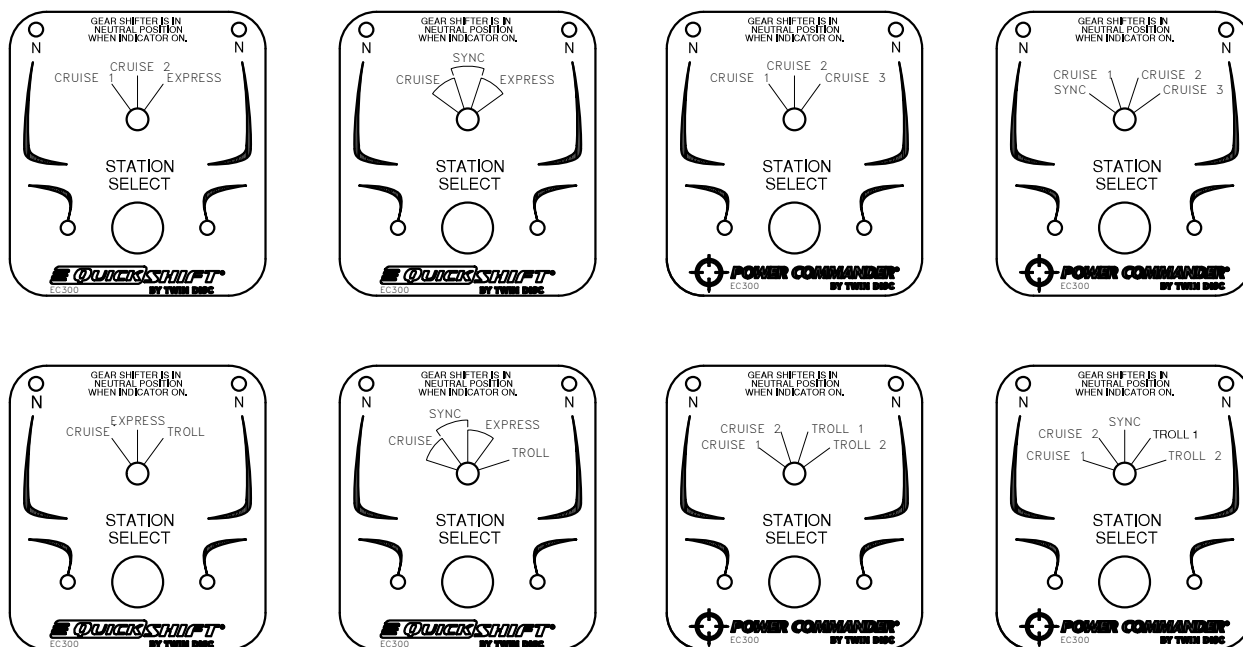


Figure 7. Analog Control Head Labels

The Mode Select switch can be used to select any of the following, depending on the Control Head type that is installed.

- ☐ Cruise mode, and up to three preset engine speeds while in the cruise mode.

Note: To change mode from cruise 1 (C1) to C2 or C3 - the lever must be in the forward detent position, the neutral detent position, or the reverse detent position.

- ☐ Engine Synchronization while in the cruise mode.
- ☐ Troll mode, and up to two preset engine speeds while in the troll mode.
- ☐ Express mode.
- ☐ Engine Synchronization while in the express mode.

Mode Select Switch (Digital Control Heads)

Unlike an analog Control Head, with a separate Model Select switch and Station Select button, the digital Control Head has both of these functions combined into one button. Selecting any one of the optional buttons selects the station and mode.

Overlays for Control Heads are available with a variety of function combinations. The following figures show the labels from several different Control Head configurations, some of which may be available in both single lever and dual lever Control Heads.



Figure 8. Digital Control Head Labels

The buttons on the Control Head can be used to select any of the following, depending on the configuration of the Control on the vessel.

- ☐ Cruise mode, and up to three preset engine speeds while in the cruise mode. Additional engine speeds are obtained by subsequent presses of the cruise button.

Note: To change mode from cruise 1 (C1) to C2 or C3 - the lever must be in the forward detent position, the neutral detent position, or the reverse detent position.

- ☐ Engine Synchronization while in the cruise mode.
- ☐ Troll mode, and up to three preset engine speeds while in the troll mode. Additional engine speeds are obtained by subsequent presses of the troll button.
- ☐ Express mode.
- ☐ Engine Synchronization while in the express mode.

Display Features

The optional Display can be used to provide a variety of information to the operator. There are two lines of data displayed at any time.

When the Control is powered, and a Control Station selected, the top line of the Display shows N, FWD, or REV, followed by CS1, CS2, etc, up to CS8 denoting the Control Station that is in command.

The lower line of the Display shows CRUISE, CRUISE S, EXPRES, EXPRES S, or TROLL. This indicates the mode in which the Control is operating, and whether it is operating in a synchronized condition or not.

The optional Display can be used to supply operating data at any time by pushing either the up arrow button or the down arrow button to scroll through the available information.

The data that may be available, depending on the specific configuration, is as follows:

- ☐ PROP SPD on the top line, and XXXX RPM on the bottom line
- ☐ INPT SPD on the top line, and XXXX RPM on the bottom line
- ☐ OIL TEMP on the top line, and XXX °C or XXX °F on the bottom line
- ☐ OIL PRES on the top line with XXXX PSI or XXXX KPa on the bottom line
- ☐ THRTXXX% on the top line, and COILXXX% on the bottom line

The units are selectable at the time of configuration.

Station Transfer

Station Transfer is the process of transferring control of the engine and marine transmission functions from one control station to another. It is only applicable on vessels with more than one control station.

Station Transfer is accomplished by pressing the Station Select button on the analog Control Head.

Station Transfer is accomplished by pressing any button on the digital Control Head.

Station Transfer Signal

If enabled in the configuration, an audible tone sounds when a Station Transfer is in process.

Station Transfer Types

The EC300 Control System supports several optional types of Station Transfer. Twin Disc Incorporated, or the local technician, makes the selection during configuration of the system. The four major types of Station Transfer are:

- ☐ [“Instant Station Transfer” on page 19](#)
- ☐ [“Neutral Station Transfer” on page 20](#)
- ☐ [“Lever Match Station Transfer” on page 21](#)
- ☐ [“Lever Match with Acknowledge Station Transfer” on page 22](#)
- ☐ [“Emergency Transfer \(Double button press\)” on page 23](#)

Instant Station Transfer

In this configuration, the station is selected as soon as the Station Select button is pressed. This is regardless of the lever position on either the active Control Head or the target Control Head. When the target Control Head is made active, all other Control Heads in the system are made inactive.

Note: It is good practice to always select the operating mode prior to pressing the Station Select button.

Note: On digital Control Heads, any of the four button switches that are configured in the Control serve as the Station Select button.

Note: Depending on applicable codes and standards. Instant Station Transfer may not be allowed.

CAUTION

When a Station Select button is pressed at a Control Head other than the active Control Head, the Controller responds to the lever positions at the newly activated Control Head. Unexpected vessel speed and direction changes can occur when the lever positions are not in the desired positions prior to taking command at a new Control Station.

1. Select the desired mode at the new target Control Head.

Note: With digital Control Heads, the mode does not change on Station Transfer. After taking command, the new mode must be selected if a change is desired.

Note: With analog Control Heads, the mode does not change on Station Transfer unless the lever(s) are at a detent position.

2. Place the levers in the desired position at the target Control Head.
3. Take command at the target Control Head by pressing the Station Select button.
4. Observe that the red Station Select LED next to the Station Select button illuminates.
5. Make other control selections as desired.

Neutral Station Transfer

In this configuration, station transfers are only allowed when the Station Select button on the target Control Head is pressed and the lever(s) on the active Control Head and target Control Head are in the neutral detent position.

When the Station Select button on the target Control Head is pressed, and the lever(s) are not in the neutral detent position, the neutral LEDs flash on both the active Control Head and the target Control Head.

When the lever(s) on the target Control Head are moved to the neutral detent position, the neutral LEDs stop flashing and the target Control Head becomes the active Control Head.

When the target Control Head lever(s) are not moved to the neutral detent position within 30 seconds of the request, the station transfer request shall be cancelled and the neutral LEDs stops flashing.

Note: There is an option for Emergency Station Transfer that must be enabled during system configuration. See [“Emergency Transfer \(Double button press\)” on page 23](#).

Lever Match Station Transfer

This type of station transfer is designed to satisfy certain American Bureau of Shipping (ABS) specification requirements.

In this configuration, station transfers are only allowed when the levers on the target and active Control Heads are in matching positions. When the Station Select button on the target Control Head is pressed, and the lever(s) on the target Control Head are mismatched from those on the active Control Head, the neutral LEDs on both the active Control Head and the target Control Head flash. The greater the mismatch, the slower the LED flash rate becomes.

As the lever(s) on the target Control Head are moved closer to the position of the lever(s) on the Active Control Head, the LED flash rate increases. When the levers are matched, the target Control Head is automatically made active and the Active Control Head made inactive.

The station transfer request is cancelled and the neutral LEDs stop flashing when:

- ☐ A mismatch condition exists
- ☐ The lever(s) on the Active Control Head are moved
- ☐ 30 seconds pass without moving the lever(s) on the target Control Head

Note: There is an option for Emergency Station Transfer that must be enabled during system configuration. See [“Emergency Transfer \(Double button press\)” on page 23](#).

Lever Match with Acknowledge Station Transfer

This type of station transfer satisfies certain ABS specification requirements. In this configuration, station transfers are only allowed when the levers on the target and active Control Station are in matching positions and when the station transfer is acknowledged by the active Control Head.

To initiate a station transfer, a Station Select button on a Control Head at the target station must be pressed. The neutral LEDs at both the active and target stations begin to flash. This notifies the active station that the target station has requested a transfer.

To continue, a Station Select button on a Control Head at the active station must be pressed. The Station Select LED is full on. This causes the neutral LEDs on both stations to begin to flash, indicating to the target station that the active station has acknowledged the transfer request.

When the lever(s) at the active station and the target station are not matched, the neutral LEDs on both the active and the target stations flash. As the lever(s) at the target station are moved closer to the position of the lever(s) at the active station, the flash rate of the LEDs increases.

When the lever(s) at the target station match the position of the lever(s) at the active station, the neutral LEDs at both stations flash rapidly. This indicates that the lever(s) at both stations are matched and the transfer may continue.

The transfer is completed when the Station Select button on a Control Head at the target Control Station is pressed. The button press is only recognized when the lever(s) are matched.

When no activity is sensed at either station after a transfer has been initiated for a period of ten seconds, the transfer sequence is canceled. Also, when the acknowledge has been made and the lever(s) on the active control station are moved, the transfer is canceled.

Note: There is an option for Emergency Station Transfer that must be enabled during system configuration. See [“Emergency Transfer \(Double button press\)” on page 23.](#)

Emergency Transfer (Double button press)

This transfer type must be enabled in the configuration via the MFST. Emergency Transfer (Double button press) operates in tandem with the selected normal station transfer type and allows a station transfer under emergency conditions or when the active station or station harness is damaged. When the station select button on the target station is pressed twice within 500 ms, the system executes an instant transfer to the target station without regard for the selected normal station transfer type.

Emergency Manual Mechanical Control

In the event of electrical or EC300 Control failure, see [“Flash Codes” on page 29](#) for information about failure codes, verify whether the vessel’s transmissions have a manual gear select capability (come-home feature) in addition to the electronic control.

In the event that the EC300 Control fails and the engine and or transmission are controlled by push-pull cables, the push-pull cables are mechanically and electrically free to move. The throttle, troll, or gear select lever may be operated manually as required. When the servo actuator resists manual control, unplug the connector at the servo actuator.

When the EC300 Control is partially functioning, and a Twin Disc Display is present, the Neutral Start relay can be “forced on” in order to start the engine. Refer to the Configuration and Troubleshooting Manual (1025568) for more detailed information.

When the EC300 Control is not functioning, the engine can be started by placing a jumper between the neutral start interlock pins 9 and 10 in the cable connected to the EC300 Control’s Connector J5. This jumper should be placed at the engine control if practical. Refer to the engine manufacturer’s drawings and wiring diagrams.

Individual Engine Operations

Engine Start

1. At the selected Control Station, place the lever(s) in the neutral detent position.
2. Place the ignition switch for the desired engine in the On position as required to activate the EC300 Control System.
3. Press and release the Station Select button on the Control Head.

Note: The red Station Select LED for the desired engine must illuminate.
4. Verify that the red Station Select LED(s) next to the Station Select button is/are illuminated. This indicates that the station is in command.
5. Start the engine with the ignition switch.
6. Warm the engine using the Mode Select switch in a higher Cruise position, or Direction Disabling ,as required.

Engine Warm-up while using Direction Disable Mode

Note: The direction disable feature can be used any time that engine speed above idle is required while keeping the transmission in neutral. The engine speed can be varied from minimum to maximum.

1. Press and hold the Station Select button while moving the lever(s) in either the forward or reverse direction.
2. Set the desired engine speed by positioning the lever(s).
3. When the engine is warm, return the lever(s) to the neutral detent position.

CAUTION

When the lever is returned to the neutral detent position from the Direction Disable mode, the Controller resets and normal operation resumes. That is, the transmission shifts when the lever is moved in the forward or in the reverse direction without pressing and holding the Station Select button.

Engine Shutdown

1. At the selected Control Station, place the lever in the neutral detent position.
2. Switch the ignition off to power down the EC300 Control System.

Engine Synchronization

Note: The port most engine is the master. All other engines are slaves.

When single lever sync is not selected in the configuration, synchronization operation in the EC300 Control System has the following features and characteristics:

- ☐ Logically controlled to operate only when all active engines are in Cruise Sync or Express Sync mode and forward direction.
- ☐ Automatically turns on when all levers are moved in the forward direction and all Mode Select Switches are in the Cruise Sync or Express Sync position.
- ☐ Automatically shuts off when any lever is moved out of the forward direction.
- ☐ “Authority” is limited to approximately 7 1/2 degrees of the slave’s lever(s) position. A slave Control can add or subtract up to 7 1/2 degrees of lever travel from the engine throttle command received from the master control.
- ☐ Throttles can be used to maneuver the boat without turning synchronization off. A slave’s engine speed starts to increase or decrease (depending on the direction of travel) when the slave’s lever has left the 7 1/2 degree synchronization window.
- ☐ With the master engine stable, the slave engine(s) are normally brought to match the master engine’s speed within 5 rpm in 5 to 10 seconds. The timing depends on the differences between engine speeds prior to engaging synchronization.
- ☐ Synchronization is deselected by moving the Mode Select switch out of the Cruise Sync or the Express Sync position.

Synchronizing Engines

Note: Synchronization occurs when all active slave levers are within 7 1/2 degrees (approximately two finger widths) of the master lever.

1. Move all levers together while setting the master engine to the desired operating speed.
2. Move the Mode Select switch to the Cruise Sync or Express Sync position on all Control Heads.

Note: The slave engine(s) increase or decrease speed to match the master engine speed each time the master lever is moved provided each slave's lever is within 7 1/2 degrees of the master lever.

- To slightly change speeds, move the master lever ensuring that the 7 1/2 degree synchronization window is maintained.
- To significantly change speeds, move all levers together ensuring that the 7 1/2 degree synchronization window is maintained.

Ending Engine Synchronization

1. To end synchronization, do one of the following:
 - At the selected Control Station, deselect Sync mode.
 - Select the neutral detent position or Reverse detent position with either lever.
 - Move either lever beyond the 7 1/2 degree limitation in position.
2. Observe that the starboard engine speed no longer follows the port engine speed.
3. Control engine speeds independently using the appropriate levers.

Single Lever Synchronization

Note: The master engine is either the port most engine, or the starboard most engine, determined by the configuration or by the use of a Sync Master Select Switch.

Note: When the starboard controller is configured as the master, on a vessel with an odd number of engines greater than 1, then the Controller that is established as the highest numbered Controller (during Setup and Configuration) is the starboard master. The highest numbered controller in this type of system cannot be attached to the starboard lever of a dual lever control head.

Single Lever Synchronization operation in the EC300 Control System has the following features and characteristics:

- ☐ Logically controlled to operate only if all active engines are in Cruise Sync or Express Sync mode and in the forward detent or more position.
- ☐ Automatically turns on if all levers are moved in the forward direction and all Mode Select Switches are in the Cruise Sync or Express Sync position.
- ☐ Automatically shuts off if any lever is moved out of the forward direction.
- ☐ “Authority” is not limited as long as the slave levers remain in the forward detent or more position.
- ☐ With the master engine stable, the slave engine(s) are normally brought to match the master engine’s speed within 5 rpm in 5 to 10 seconds. The timing depends on the differences between engine speeds prior to engaging synchronization.
- ☐ When an error occurs that disables synchronization, the engines slowly ramp to the actual lever position speeds.

Flash Codes

The EC300 Control provides a visual indication, LED flash codes, to the operator when a fault condition exists. The fault conditions are classified as:

- ❑ Serious faults: These faults generate a log entry complete with parameter values associated with the fault (a snap shot).
- ❑ Catastrophic faults: These faults generate a log entry only as writing a complete snap shot is unlikely. These are internal controller and power supply faults.

The optional display provides text messages about any fault conditions that exist. The fault messages are displayed in a cyclical fashion with the main display. This series of screens is repeated until the Control's power is cycled, at which point most faults are cleared, or the inhibit is cleared explicitly. **INHIBIT ACTIVE** is displayed when a fault condition exists that inhibits operation. Pressing both buttons while **INHIBIT ACTIVE** or a fault screen is displayed provides additional information about the nature of the inhibit or that fault, as applicable.

Depending on the installed control heads, the EC300 Control uses the following LEDs:

- ❑ Analog stations:
 - Station Active LED: Used for failure conditions that inhibits start and invokes controller neutral. Failure codes are flashed whenever the Control is turned on because the failure inhibits start and invokes controller neutral by default.
 - Neutral LED: Used for failure conditions that do not inhibit start nor invoke controller neutral. Failure codes are flashed only when the active station's lever is in neutral.
- ❑ Digital stations:
 - Station Active LED: Used for failure conditions that inhibits start and invokes controller neutral. Failure codes are flashed whenever the Control is turned on because the failure inhibits start and invokes controller neutral by default.
 - Neutral LED: Used for failure conditions that does not inhibit start nor invokes controller neutral. Failure codes are flashed only when the active station's lever is in neutral.

- Alarm LED: Used for all faults. Failure codes shown at all times.
- Inhibit LED: Used for inhibit flash codes. Failure codes shown at all times.

Only the first fault to be written to the display will have its code flashed on the appropriate LED. Subsequent faults will not be flashed via the LEDs. When all fault conditions are cleared from the display the flashing diagnostic code stops.

Alarms

The Control turns on the Alarm Relay (J8 pins 7 and 8) after initialization when enabled in the MFST. When disabled, the Alarm Relay is not used. When enabled, the Alarm Relay indicates a fault condition when a fault is logged.

Note: See your system installation documentation to see how the Alarm Relay is wired in your system.

When the active station is a digital station, the digital station alarm beeper is also turned on. The alarm remain on until the active station's Station Select button is pressed.

Fault Information Tables

Table 1. Internal Faults							
Flash Code	Double Button Press Message	Primary Message	Inhibits				
			Cruise	Express	Troll	Sync	Start*
None	UNDEFINE TRAP	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	CPU CLK FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	WDT TMO FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	NMI FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	STK OVR FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	STK UNDR FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	UDF OPCD FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	PRT INST FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	ILL ACCS FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes

Table 1. Internal Faults							
Flash Code	Double Button Press Message	Primary Message	Inhibits				
			Cruise	Express	Troll	Sync	Start*
None	ILL INST FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	ILL BUS FAULT	CONTROL ERROR	Yes	Yes	Yes	Yes	Yes
None	RAM FAULT	Call For Help	Yes	Yes	Yes	Yes	Yes
None	MEMORY FAIL-CLK	TRAN SYS FAULT	-	-	-	-	-
None	SYSTEM CORRUPT	SYSTEM CORRUPT	Yes	Yes	Yes	Yes	Yes
None	INVALID SOFTWARE	TRAN SYS FAULT	Yes	Yes	Yes	Yes	Yes
535	CRC FAULT	TRAN SYS FAULT	Yes	Yes	Yes	Yes	Yes
* Invokes Controller Neutral							

Table 2. Power Supply Faults								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
None	MAIN AUX HI LO	PWR PROB		Yes	Yes	Yes	Yes	Yes
None	MAIN AUX HI HI	PWR PROB		Yes	Yes	Yes	Yes	Yes
None	MAIN AUX LO HI	PWR PROB		Yes	Yes	Yes	Yes	Yes
None	MAIN AUX LO LO	PWR PROB		Yes	Yes	Yes	Yes	Yes
434	ThrotPwr LOW	TRAN SYS FAULT	External throttle circuit power supply is low	-	-	-	-	-
531	MAIN/ AUX HIGH	PWR PROB	Main or auxiliary power input is too high	-	-	-	-	-
532	MAIN/ AUX LOW	PWR PROB	Main and auxiliary power input are too low	-	-	-	-	-
533	A2D REF HIGH	PWR PROB	EC300 Controller internal reference voltage is too high	-	-	-	-	-
534	A2D REF LOW	PWR PROB	EC300 Controller internal reference voltage is too low	-	-	-	-	-
565	STN XFER HI CRNT	PWR PROB						
*Invokes Controller Neutral								

Table 3. Servo Faults								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
521	NO THROT- TLE	TRAN SYS FAULT	Servo actuator is configured as a mechanical throttle and has an over current failure	-	-	-	-	-
522	NO GEAR	TRAN SYS FAULT	Servo actuator is configured as a mechanical gear and has an over current failure	-	-	-	-	-

Table 3. Servo Faults

523	NO TROLL	TRAN SYS FAULT	Servo actuator is configured as a mechanical troll and has an over current failure	-	-	-	-	-
*Invokes Controller Neutral								

Table 4. Sensor Faults

Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start
221	INPT SPD SHORT	TRAN SYS FAULT	Transmission input speed sensor is shorted	-	Yes	Yes	Yes	-
222	INPT SPD OPEN	TRAN SYS FAULT	Transmission input speed sensor is open	-	Yes	Yes	Yes	-
224	PROP SPD OPEN	TRAN SYS FAULT	Propeller speed sensor is open	-	-	-	Yes	-
223	PROP SPD SHORT	TRAN SYS FAULT	Propeller speed sensor is shorted	-	-	-	Yes	-
225	PROP SPD MISSING	TRAN SYS FAULT	Propeller speed sensor is missing. This means there is no propeller speed sensor open or shorted fault but one of the direction clutches is fully engaged and there is non-zero engine speed but no propeller speed. The most likely cause is that the sensor gap is too large.	-	-	-	Yes	-
226	INPT SPD MISSING	TRAN SYS FAULT	Transmission input speed (engine speed) is missing. This means there is no input speed sensor open or shorted fault but one of the direction clutches is fully engaged and there is non-zero propeller speed but no input speed. The most likely cause is that the sensor gap is too large.	-	Yes	Yes	Yes	-
231	OIL TEMP LOW	TRAN SYS FAULT	Transmission oil temperature is low	-	Yes	Yes	No	-
232	OIL TEMP HIGH	TRAN SYS FAULT	Transmission oil temperature is high	-	-	-	-	-

Table 4. Sensor Faults								
233	OIL TEMP OPEN	TRAN SYS FAULT	Transmission oil temperature sensor is open	-	-	-	-	-
234	OIL TEMP SHORT	TRAN SYS FAULT	Transmission oil temperature sensor is shorted	-	-	-	-	-
235	INT TEMP HIGH	TRAN SYS FAULT	EC300 Controller internal temperature high	-	-	-	-	-
236	INT TEMP LOW	TRAN SYS FAULT	EC300 Controller internal temperature low	-	-	-	-	-
451	PropXcte LOW	TRAN SYS FAULT	Transmission output sensor excitation voltage is lower than 4.9V	-	Yes	Yes	-	-
454	PropXcte HIGH	TRAN SYS FAULT	Transmission output sensor excitation voltage is higher than 5.1V	-	Yes	Yes	-	-
*Invokes controller neutral								

Table 5. Station Faults								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start
116	EXP BOX PWR PROB	TRAN SYS FAULT		-	-	-	-	-
161	STATIONn CRUI STK	TRAN SYS FAULT	Control Head n (where n = 1 through 8) cruise mode switch is stuck closed	-	-	-	-	-
162	STATIONn EXPR STK	TRAN SYS FAULT	Control Head n (where n = 1 through 8) express mode switch is stuck closed	-	-	-	-	-
163	STATIONn TROL STK	TRAN SYS FAULT	Control Head n (where n = 1 through 8) Troll Mode Switch Is Stuck Closed	-	-	-	-	-
164	STATIONn SYNC STK	TRAN SYS FAULT	Control Head n (where n = 1 through 8) sync mode switch is stuck closed	-	-	-	-	-
321	STATION1 MISSING	TRAN SYS FAULT	Control Head 1 is configured but not detected	-	-	-	-	-
322	STATION2 MISSING	TRAN SYS FAULT	Control Head 2 is configured but not detected	-	-	-	-	-
323	STATION3 MISSING	TRAN SYS FAULT	Control Head 3 is configured but not detected	-	-	-	-	-
325	STATION1 LOW	TRAN SYS FAULT	Control Head 1 power supply voltage is low	-	-	-	-	-
326	STATION2 LOW	TRAN SYS FAULT	Control Head 2 power supply voltage is low	-	-	-	-	-
327	STATION3 LOW	TRAN SYS FAULT	Control Head 3 power supply voltage is low	-	-	-	-	-
331	ILLEGAL MODE	TRAN SYS FAULT	Mode switch voltage of the active Control Head is invalid	-	-	-	-	-
333	STATION4 LOW	TRAN SYS FAULT	Control Head 4 power supply voltage is low	-	-	-	-	-
334	STATION5 LOW	TRAN SYS FAULT	Control Head 5 power supply voltage is low	-	-	-	-	-
335	STATION6 LOW	TRAN SYS FAULT	Control Head 6 power supply voltage is low	-	-	-	-	-
336	STATION7 LOW	TRAN SYS FAULT	Control Head 7 power supply voltage is low	-	-	-	-	-
337	STATION8 LOW	TRAN SYS FAULT	Control Head 8 power supply voltage is low	-	-	-	-	-
341	STATION4 MISSING	TRAN SYS FAULT	Control Head 4 is configured but not detected	-	-	-	-	-

Table 5. Station Faults								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start
342	STATION5 MISSING	TRAN SYS FAULT	Control Head 5 is configured but not detected	-	-	-	-	-
343	STATION6 MISSING	TRAN SYS FAULT	Control Head 6 is configured but not detected	-	-	-	-	-
344	STATION7 MISSING	TRAN SYS FAULT	Digital lever internal power supply is high	-	-	-	-	-
345	STATION8 MISSING	TRAN SYS FAULT	Control Head 8 is configured but not detected	-	-	-	-	-
436	COMM FLT No Heads	TRAN SYS FAULT	At power on, Control Head 1 was not detected	-	-	-	-	-
441	STATIONn CAL Fit	TRAN SYS FAULT	Digital lever n (where n = 1 through 8) out of calibration	-	-	-	-	-
442	STATIONn POT2 Fit	TRAN SYS FAULT	Lever position sensor n (where n = 1 through 8) has failed	-	-	-	-	-
443	STATIONn NVM Fit	TRAN SYS FAULT	Digital lever n (where n = 1 through 8) non-volatile memory failure	-	-	-	-	-
444	STATIONn HIGH Fit	TRAN SYS FAULT	Digital lever n (where n = 1 through 8) internal power supply is high	-	-	-	-	-
445	STATIONn LOW Fit	TRAN SYS FAULT	Digital lever n (where n = 1 through 8) internal power supply is low	-	-	-	-	-
446	STATIONn POT1 Fit	TRAN SYS FAULT	Lever position sensor n (where n = 1 through 8) has failed	-	-	-	-	-
461	EJS Communications	EJS SYS FAULT		-	-	-	-	-
*Invokes controller neutral								

Table 6. Coil Faults								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
241	FOR- WARD CIRCUIT	TRAN SYS FAULT	Forward valve coil circuit is either open or shorted	Yes	Yes	Yes	-	Yes
242	REVERSE CIRCUIT	TRAN SYS FAULT	Reverse valve coil circuit is either open or shorted	Yes	Yes	Yes	-	Yes
244	SHFT BRK CIRCUIT	TRAN SYS FAULT	Shaft brake valve coil circuit is either open or shorted	Yes	Yes	Yes	-	-
245	TROLL CIRCUIT	TRAN SYS FAULT	Troll valve coil circuit is either open or shorted	-	-	-	-	-
246	NEUTRAL CIRCUIT	TRAN SYS FAULT	Neutral valve coil circuit is either open or shorted	-	-	-	-	-
247	TrollEnb CIRCUIT	TRAN SYS FAULT	Troll enable valve coil circuit is either open or shorted	-	-	-	-	-
251	Rev&Fwd BD COM- BO	TRAN SYS FAULT	Reverse & forward coils are on simultaneously	Yes	Yes	Yes	-	Yes
252	Rev&Neut BD COM- BO	TRAN SYS FAULT	Reverse & neutral coils are on simultaneously	Yes	Yes	Yes	-	Yes
253	Rev&Brak BD COM- BO	TRAN SYS FAULT	Reverse & brake coils are on simultaneously	Yes	Yes	Yes	-	Yes
254	Rev&Nrly BD COM- BO	TRAN SYS FAULT	Reverse coil & neutral relay are on simultaneously	-	-	-	-	Yes
255	Fwd&Neut BD COM- BO	TRAN SYS FAULT	Forward & neutral coils are on simultaneously	Yes	Yes	Yes	-	Yes
256	Fwd&Neut BD COM- BO	TRAN SYS FAULT	Forward & brake coils are on simultaneously	Yes	Yes	Yes	-	Yes
257	Fwd&Nrly BD COM- BO	TRAN SYS FAULT	Forward & neutral relay on simultaneously	-	-	-	-	Yes
262	Rev&Stab BD COM- BO	TRAN SYS FAULT	Reverse coil is on and stabilizer disable is not on	-	-	-	-	Yes
263	Fwd&Stab BD COM- BO	TRAN SYS FAULT	Forward coil is on and stabilizer disable is on	-	-	-	-	Yes
264	PTO CIR- CUIT	TRAN SYS FAULT	PTO coil circuit is either open or shorted	-	-	-	-	Yes

Table 6. Coil Faults

Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
265	EJS&Stab BD COM- BO	TRAN SYS FAULT		-	-	-	-	-

*Invokes controller neutral

Table 7. Switch Faults

Fault Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
324	LEVER FAULT	TRAN SYS FAULT	Lever voltage of the active Control Head is out of range	-	-	-	-	-
421	FILTER BY- PASSED	TRAN OIL FILTER	Differential pressure across the transmission filter is high	-	-	-	-	-
423	OilSnsor HIGH	TRAN SYS FAULT	Transmission oil pressure high fault	-	-	-	-	-
424	OilSnsor HIGH	TRAN SYS FAULT	Transmission main oil pressure is low	-	-	-	-	-
425	OilSnsor SHORT	TRAN SYS FAULT		-	-	-	-	-
426	OilSnsor OPEN	TRAN SYS FAULT	Transmission main oil pressure sensor is open	-	-	-	-	-
452	OilXcte HIGH	TRAN SYS FAULT	Transmission oil pressure sensor excitation voltage is higher than 5.1V	-	-	-	-	-
453	OilXcte LOW	TRAN SYS FAULT	Transmission oil pressure sensor excitation voltage is lower than 4.9V	-	-	-	-	-

*Invokes controller neutral

Table 8. Inhibits								
Flash Code	Double Button Press Message	Primary Message	Description	Inhibits				
				Cruise	Express	Troll	Sync	Start*
N.A.	INPT SPD TooLow	INHIBIT ACTIVE		-	-	-	-	-
N.A.	SELECT STATION	SELECT STATION		-	-	-	-	-
N.A.	SELECT NEU-TRAL	SELECT NEU-TRAL		-	-	-	-	-
227	INPT SPD TooHigh	INHIBIT ACTIVE	Transmission is unable to engage because the input speed is higher than 1000 rpm	Yes	Yes	Yes	-	-
722	INPT SPD Fault	INHIBIT ACTIVE	During cruise sync or express sync the ec300 controller has detected a input speed sensor fault	-	-	-	-	-
723	RS485 Fault	INHIBIT ACTIVE	During cruise sync or express sync the ec300 controller has detected a rs485 communication problem	-	-	-	-	-
724	PROP SPD Fault	INHIBIT ACTIVE	During express sync the ec300 controller has detected a propeller speed sensor fault	-	-	-	-	-
725	INDIRECT INHIBIT	Other Control	During cruise sync or express sync one of the controllers is unable to sync	-	-	-	-	-
*Invokes controller neutral								

Notes

Maintenance

Setting Drag

Drag adjustment is performed at each lever. Proper adjustment is necessary to ensure that the lever remains in the intended position without operator assistance.

- ☐ Analog Control Head: See [“Setting Drag - Analog Control Head”](#).
- ☐ Digital Control Head: See [“Setting Drag - Digital Control Head” on page 43](#)
- ☐ Side Mount Control Head: See [“Setting Drag - Side Mount Control Head” on page 44](#)

Setting Drag - Analog Control Head

1. Remove the control head from the cutout by loosening the set screw in the rear, as shown in [Figure 9 \(A\)](#), until the control head can be rotated to release it from the base plate front edge.

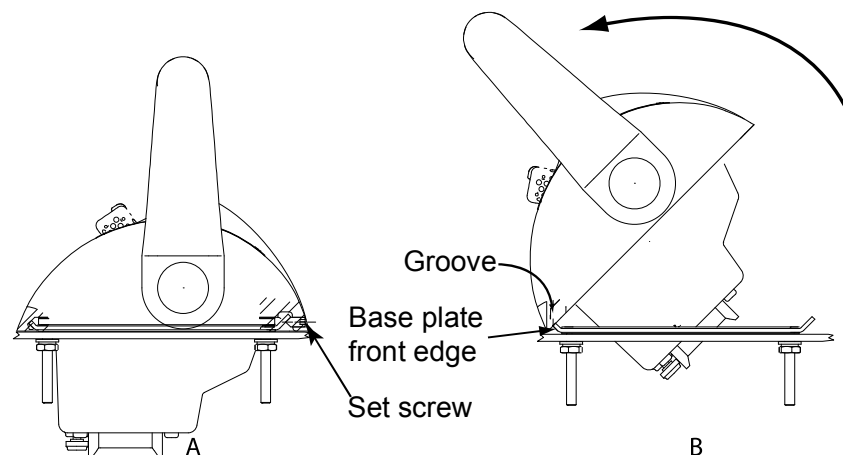


Figure 9. Control Head Removal

2. Insert an 1/8 in. hex key wrench into the opening for each lever and set drag by accessing the drag adjustment screw as shown in [Figure 10](#).

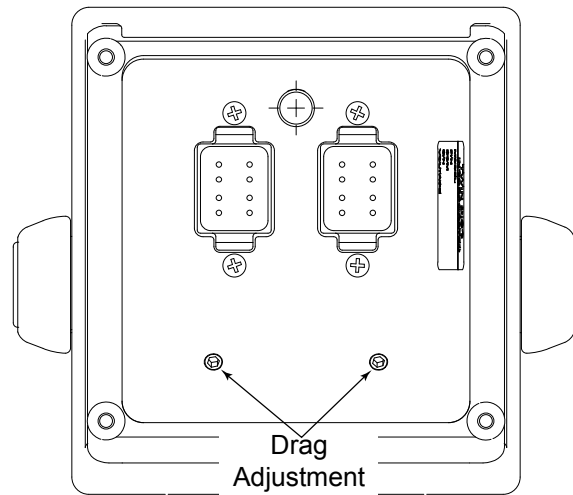


Figure 10. Drag Adjustment Screws

3. Tighten the drag adjustment screw(s) until the desired drag is obtained over the full lever travel.

Note: 0.45 to 0.91 kg (1 to 2 lbs) average drag is normally desirable.

4. Tilt the control head as shown in A in [Figure 11](#) and engage the groove internal to the control head.

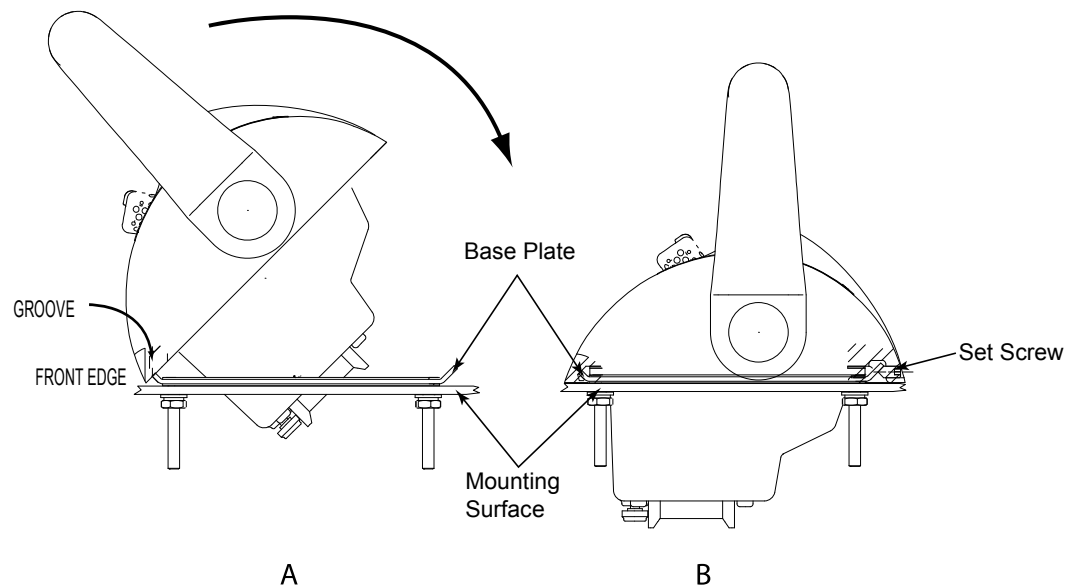


Figure 11. Control Head Installation

5. When engaged, tilt the control head until it is flat and contacts the gasket as shown in B.
6. Ensure that the control head fully engages the base plate and then tighten the two set screws until they securely contact the base plate and the control head is held securely in position. Tighten them against the base plate to 1.13 Nm (10 lb-in.) maximum.

Setting Drag - Digital Control Head

1. Remove the digital control head from the cutout and correct the fit as necessary.
2. Set drag by accessing the drag adjustment screw as shown in.

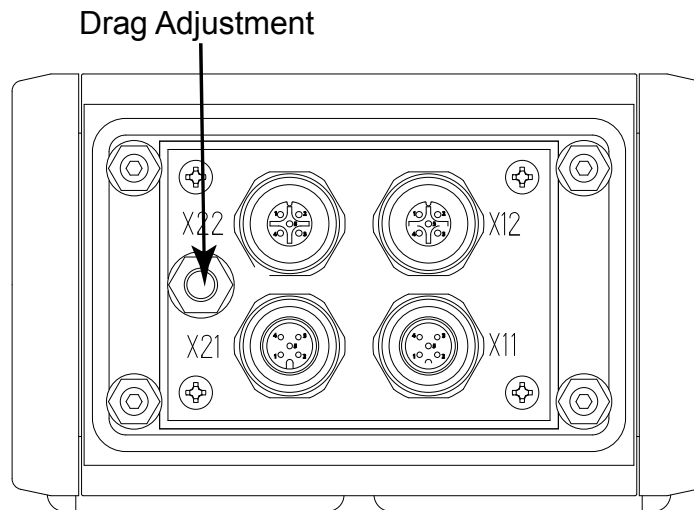


Figure 12. Drag Adjustment Screws for Single/Dual Lever Digital Control Head

3. Install the digital control head and torque the fasteners to 1.13 N-m (10 lb-in.) maximum.

Setting Drag - Side Mount Control Head

1. Set drag by accessing the drag adjustment screw as shown in.

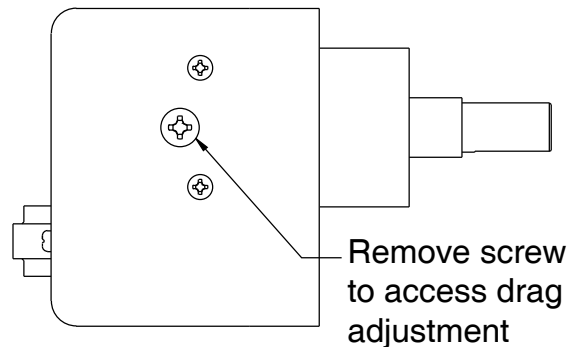


Figure 13. Drag Adjustment Screws for Side Mount Control Head Assembly

2. Insert an 1/8 in. hex key wrench into the opening for each lever.
3. Tighten the drag adjustment screw(s) until the desired drag is obtained over the full lever travel.

Note: 0.45 to 0.91 kg (1 to 2 lbs) average drag is normally desirable.

4. Connect, if required, and install the interface harness and secure/strain relieve as necessary.

Stainless Steel Control Head Cleaning

Due to environmental conditions, the stainless steel may stain or show signs of corrosion. When this happens, wipe clean with rag and clean water that does not contain chlorine. If stains or corrosion persist, use a commercial stainless steel cleaning product that does not contain chlorine.

Frequency of cleaning is based on environmental conditions and the location of the control head.

